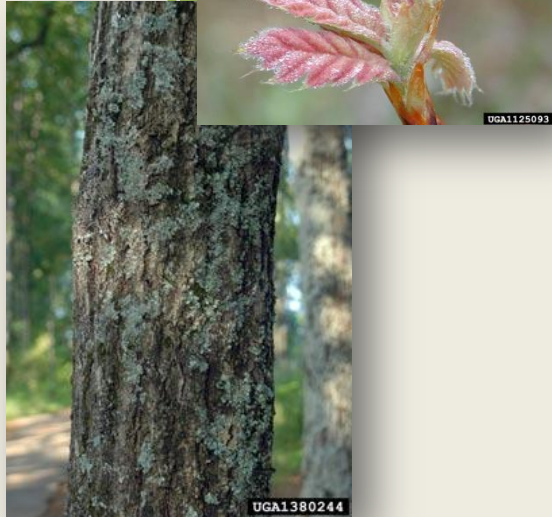


Red oak group

Northern red oak, *Quercus rubra*

Black oak, *Quercus velutina*

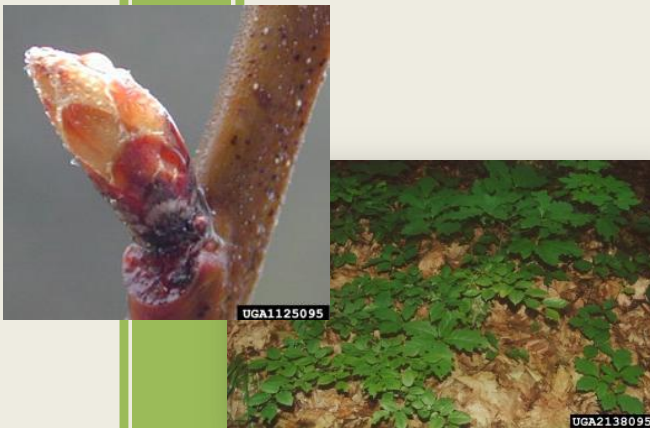
Northern pin oak, *Quercus ellipsoidalis*



The **volume in the red oak group has increased** steadily since 1983. However, there are significant differences among the species. The number of black oak and northern red oak trees has declined in almost all size classes while the number of northern pin oak has increased dramatically.

Growth and mortality rates have increased proportionately with volume. Whereas red oak species make up about 13% of all volume of trees in Wisconsin, they account for 11% of growth and mortality.

Red oaks are **important timber species**, comprising 12% of roundwood production in 2003. Given the high density of red oak wood and the large volume of red oak in Wisconsin, it may be a valuable source of woody biomass for biofuel production.



- [How has the red oak resource changed?](#)
Growing stock volume and diameter class distribution: 1983, 1996, and 2008
- [Where do red oaks grow in Wisconsin?](#)
Growing stock volume by region with map
- [How fast are red oaks growing?](#)
Average annual net growth by region and year: 1983, 1996, and 2008
- [How healthy are red oaks in Wisconsin?](#)
Average annual mortality: 1983, 1996, and 2008
- [How much red oak do we harvest?](#)
Roundwood production by product: 1997, 2003, and 2006
- [How much is red oak selling for?](#)
Prices for cordwood and sawtimber: 2000 to present
- [How much red oak biomass do we have?](#)
Oven-dry tons by region of the state: 2008

"How has the red oak resource changed?"

Growing stock volume and diameter class distribution by year

The [growing stock volume](#) of red oaks in 2008 was about 2.6 billion cft or 12.6% of total statewide volume (Chart 1). This represents an increase of 29% since 1983 and 11% since 1996.

The red oak resource is maturing; the total volume in small growing stock (5-13 inches dbh) has decreased by 12% since 1996 while the volume in large trees (over 13 inches dbh) has increased by 53% (Chart 2).

There is a significant difference in the percentage change in tree numbers between the various species of red oaks (Chart 3). The number of northern pin oak seedlings, saplings and sawtimber trees has doubled. The numbers of black oak and northern red oak have decreased in all size classes.

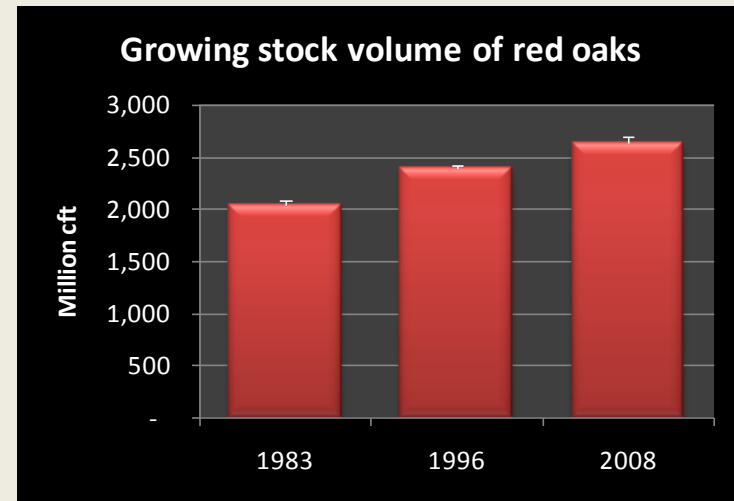


Chart 1. Growing stock volume (million cubic feet) by inventory year.
Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

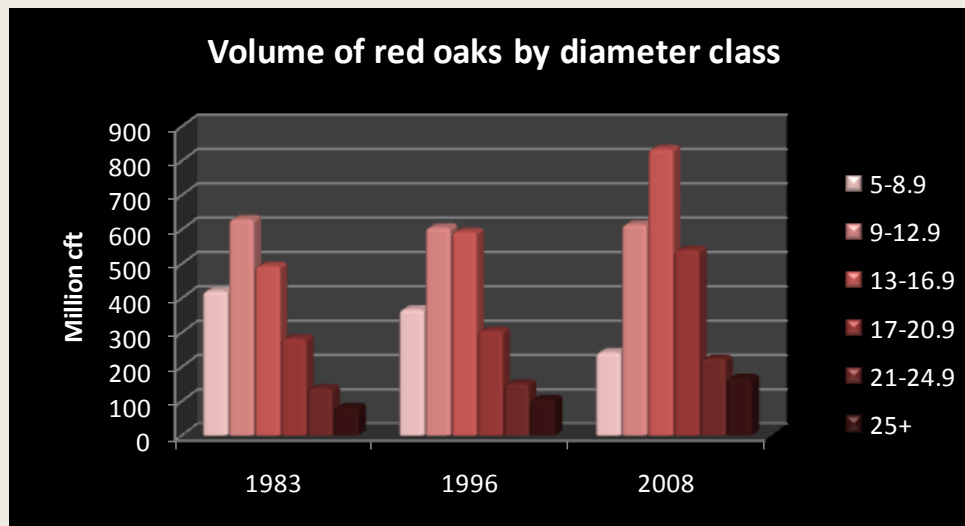


Chart 2. Growing stock volume (million cubic feet) in 1983, 1996, and 2008.
Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

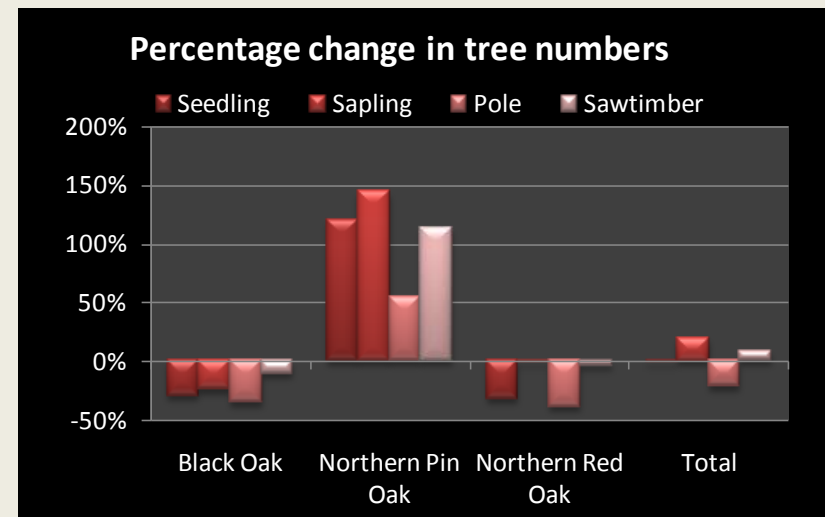
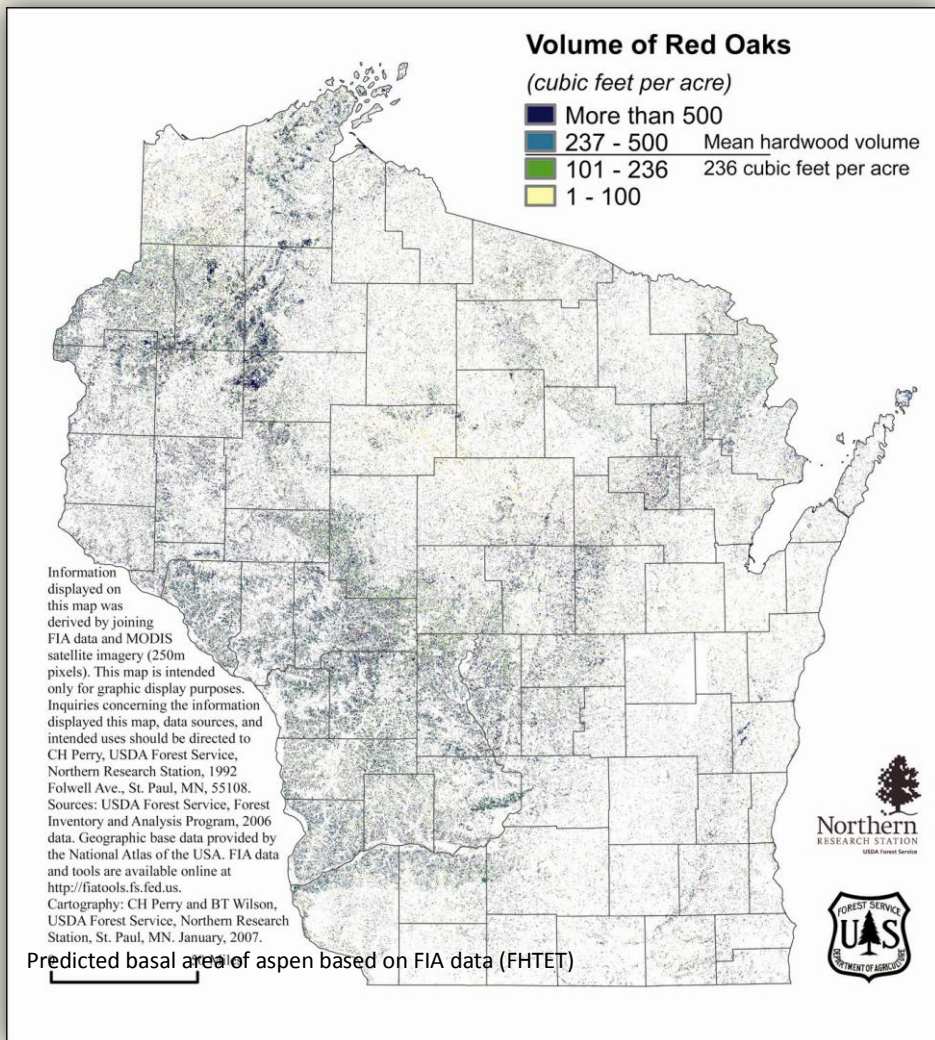


Chart 3. Percentage change in the number of live trees by size class between 1996 and 2008.
Source: USDA Forest Inventory and Analysis data 1996, and 2008.

"Where do red oaks grow in Wisconsin?"

Growing stock volume by region with map



About $\frac{2}{3}$ of red oak volume is northern red oak which occurs throughout the state but predominately in western Wisconsin, north and south (Table 1). Northern pin oak and black oak occur mainly in the central part of the state.

The vast majority of red oaks are found on the oak / hickory [forest type](#).

Table 1. Growing stock volume (million cft) by species and region of the state.

Species	Central	North east	North west	South east	South west	Total	Percent of total
Black oak	268	5	3	34	90	399	15%
Northern pin oak	212	96	114	14	65	501	19%
Northern red oak	320	303	545	106	467	1,741	66%
Total red oaks	800	404	662	153	622	2,641	100%
Percent of total	30%	15%	25%	6%	24%	100%	

Source: USDA Forest Service, Forest Inventory and Analysis 2008

Additional tables: Volume by county in 2008 ([pdf](#): [Excel](#))



"How fast are red oaks growing?"

Average annual net growth by region and year

The [average annual net growth](#) of red oaks is about 65 million cft/yr, representing 11% of statewide volume growth (Chart 4). Growth rates have increased steadily since 1983.

The highest volume growth for red oaks occurs in central Wisconsin (Table 2) but the highest growth to volume ratio occurs in the northeast part of the state.

Table 2. Average annual net growth (million cft/year) of growing stock and the ratio of growth to volume by region of the state.

Region	Net growth	Percent of Total	Ratio of growth to volume
Central	19.4	30%	2.4%
Northeast	12.0	18%	3.0%
Northwest	14.4	22%	2.2%
Southeast	1.9	3%	1.3%
Southwest	17.1	26%	2.7%
Statewide	64.8	100%	2.5%

Source: USDA Forest Inventory and Analysis 2008

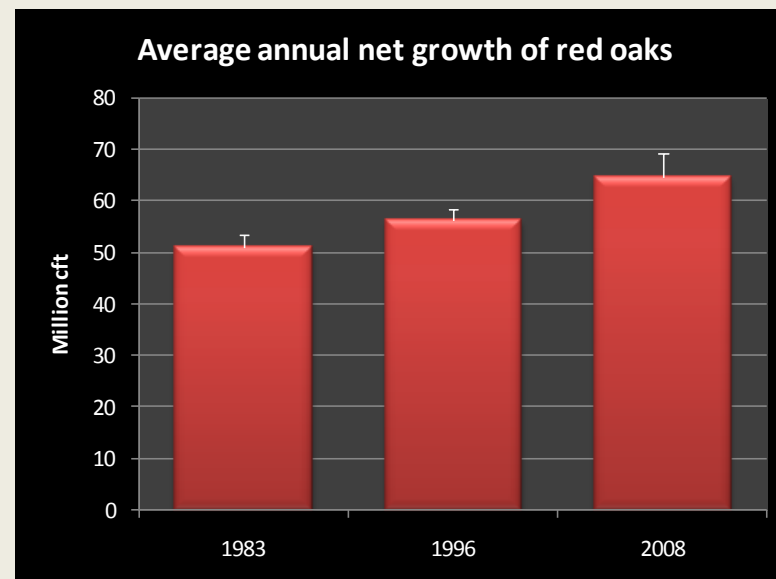


Chart 4. Average annual net growth (million cubic feet).

Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

The ratio of growth to volume for red oaks is 2.5%, lower than the statewide average of 2.8% for all species.

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How healthy are red oaks in Wisconsin?"

Average annual mortality: 1983, 1996, and 2008

The [average annual mortality](#) of red oaks, about 23.2 million cft per year in 2008, has increased 76% since 1983 and 24% since 1996 (Chart 5). The percent of statewide mortality is approximately equal to the percent of volume; 12.6% and 11.3% respectively.

The ratio of mortality to [gross growth](#) is 26% for red oak species, equal to the statewide average of 26% (Table 3).

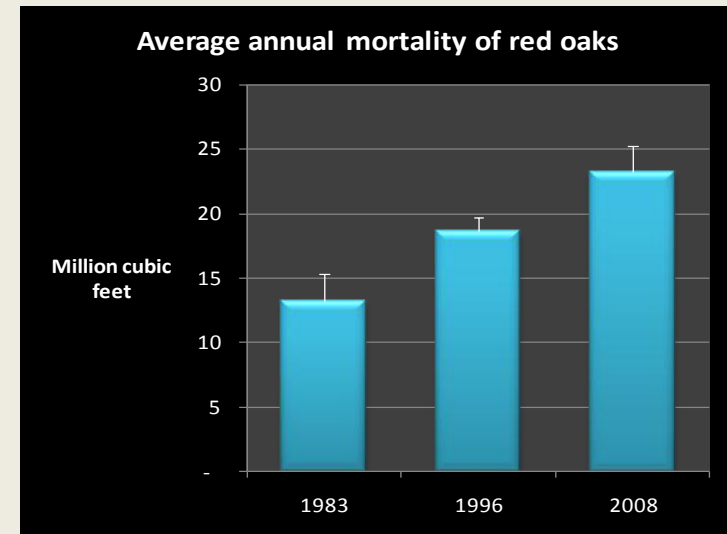


Chart 5. Average annual mortality (million cubic feet) by inventory year.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

Table 3. Mortality, gross growth, and the ratio of mortality to gross growth.

Species	Average annual mortality (cft)	Average annual gross growth (cft)	Mortality / growth
Black Oak	5,014,753	10,863,315	46%
Northern Pin Oak	6,387,379	16,747,397	38%
Northern Red Oak	11,760,239	60,309,084	19%
Total Red Oaks	23,162,371	87,919,796	26%

Source: USDA Forest Inventory & Analysis data: 2008

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How much red oak do we harvest?"

Roundwood production by product and year

In 2003, Wisconsin produced 51.5 million cft of red oak [roundwood](#) or about 12% of the state's total volume (Chart 6). The red oaks are the third most productive species group after aspen and hard maple. About 45% of this volume was in sawlogs, 30% in fuelwood and 26% in pulpwood.

Between 2003 and 2006, pulpwood production had decreased by 3.5 million cft or 26%. Red oaks now make up 7.4% of total pulpwood in the state.

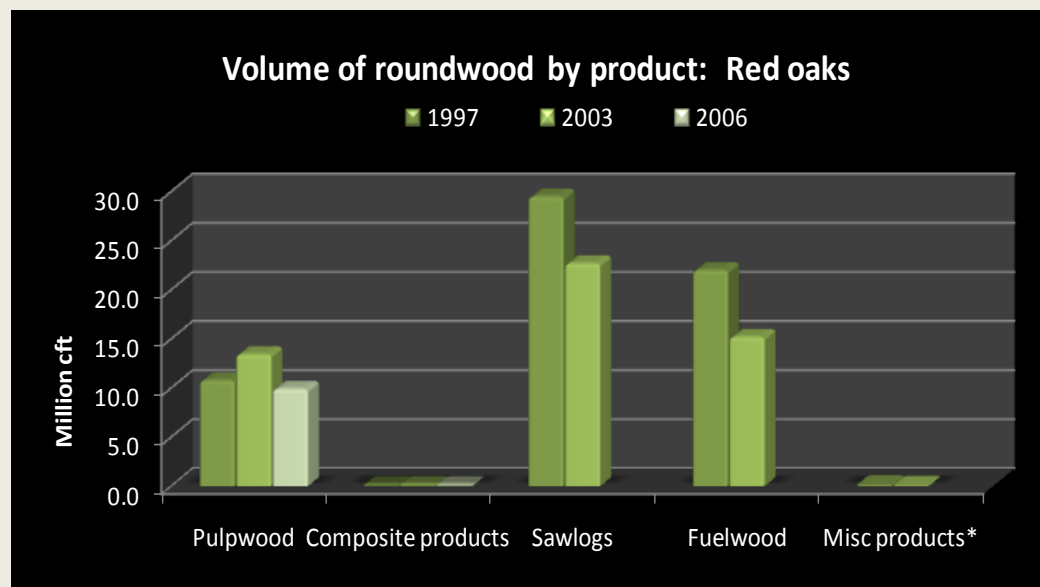


Chart 6. Volume of roundwood products. The most recent numbers for pulpwood and composite products are from 2006 and the most recent numbers for sawlogs, fuelwood and miscellaneous products are from 2003 (Ron Piva).

* Miscellaneous products include poles, posts, pilings and veneer.

Source: Timber Products Output Mapmaker, http://ncrs2.fs.fed.us/4801/fiadb/rpa_tpo/wc_rpa_tpo.ASP

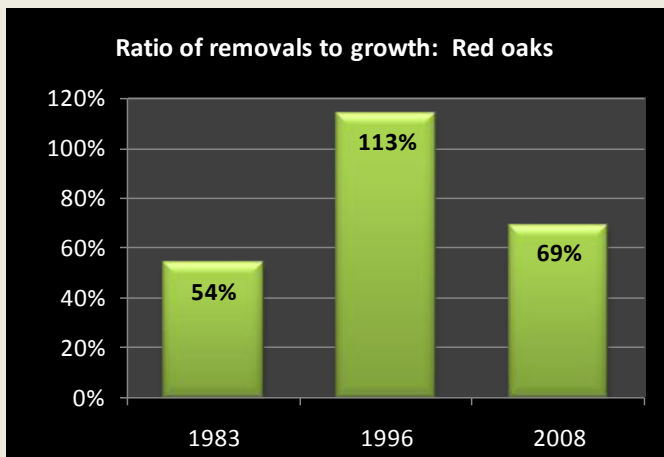


Chart 7. Ratio of volume harvested annually to net growth.

Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008.

The ratio of removals to growth appears to have peaked in 1996 and then decreased (Chart 7). This is due to a 30% decrease in removals combined with a 15% increase in growth rates since 1996. The ratio of removals to growth for red oaks was 69% in 2008, higher than the average of 59% for all species in the state.

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How much is red oak selling for?"

Prices for cordwood & sawtimber: 2000 to present

Due to the variability of timber prices from year to year and region to region, two methods of reporting prices are presented here: [Timber Mart North](#) and [weighted average stumpage prices](#) from Wisconsin Administrative Code Chapter NR 46.

Stumpage and delivered prices for sawtimber, as reported in the Timber Mart North (Chart 8), have been decreasing since 2000. Log prices are currently much higher than average for hardwoods.

Average weighted values for cordwood and logs as reported in NR46 (Table 4), have fallen from a peak in 2006. Log prices are currently twice the average price for hardwood logs.

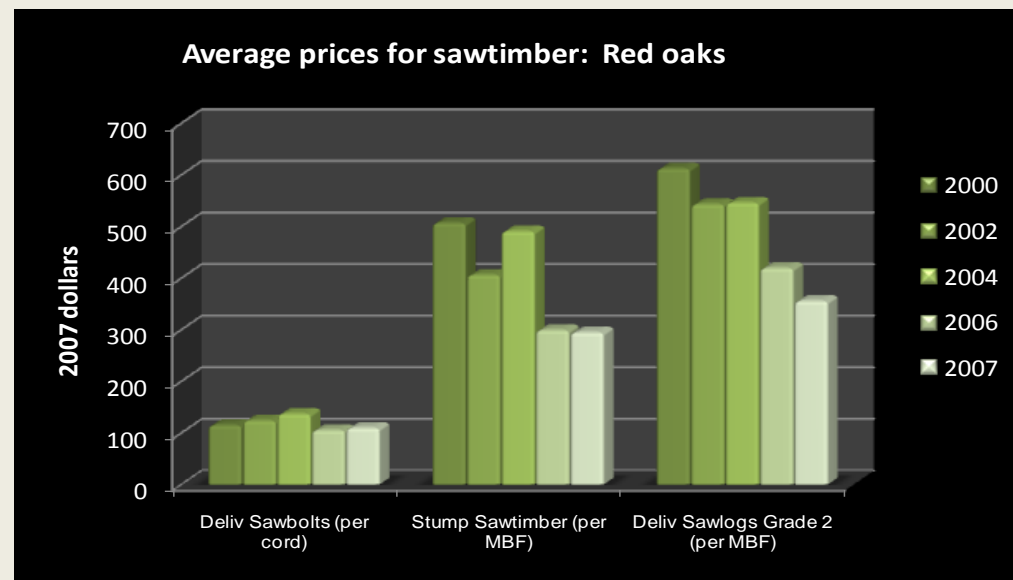


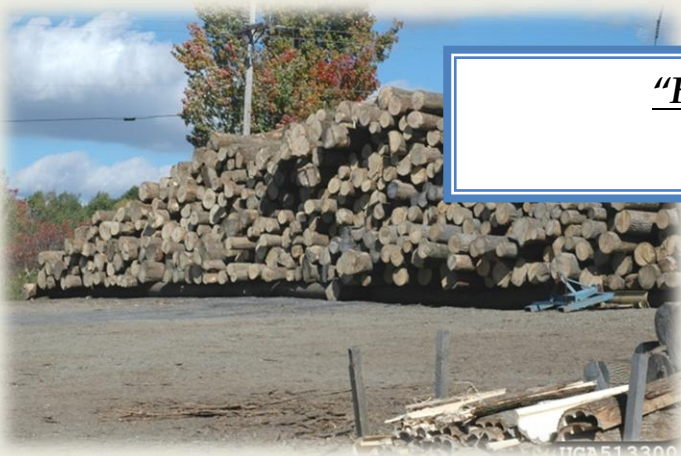
Chart 8. Average prices for cordwood and sawtimber (2007).

Source: Timber Mart North, George Banzhaf & Company, 8301 N. Allen Lane, Milwaukee, WI 53217

Table 4. Average weighted stumpage prices (adjusted for inflation to 2009 dollars) by year for Wisconsin.

Product	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average for all hardwoods
Cordwood (per cord)	\$18	\$13	\$18	\$25	\$19	\$24	\$32	\$27	NA	\$17	\$19
Logs (per MBF scribner)	\$469	\$468	\$410	\$500	\$483	\$466	\$630	\$462	\$345	\$283	\$140

Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2009



"How much red oak biomass do we have?"

Oven-dry tons by region of the state

There were 91 million oven-dry tons (ODT) of red oak biomass in 2008, an increase of 2.8 million ODT or 3%, from 1996. This species represents 15.3% of all live biomass statewide. As with volume, most red oak biomass is located in central, northwest and southwest Wisconsin (Chart 9).

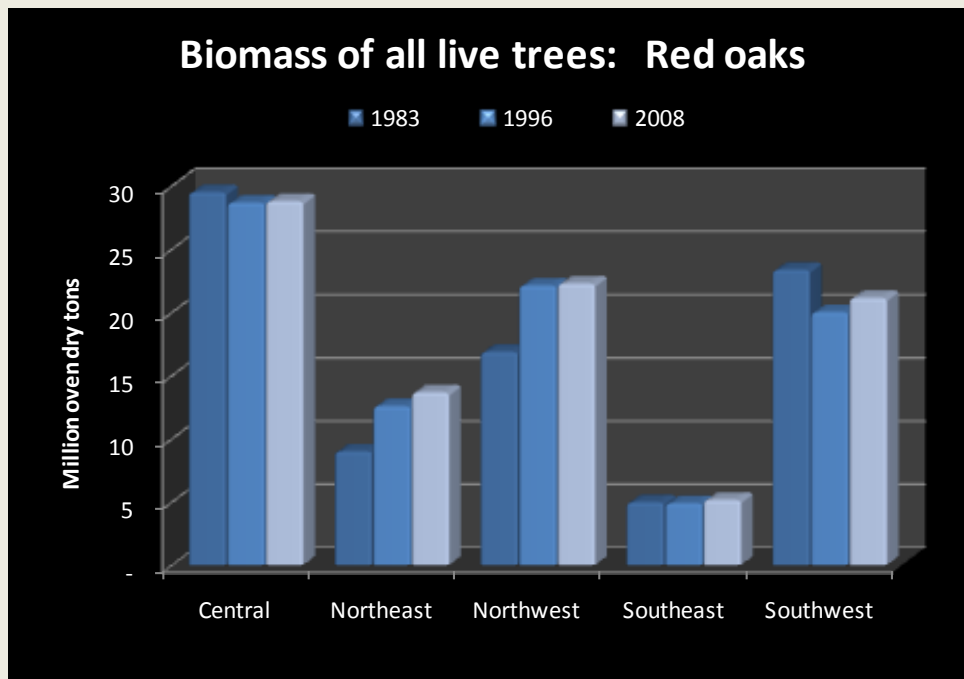


Chart 9. Biomass (million oven-dry tons) by year and region.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

The density of red oak wood is the highest of all species with a ratio of biomass to volume of 59.3 oven-dry lbs. per cubic foot (ODP/cft). The average for all hardwoods is about 50.1 ODP/cft and for all species is 46.8 ODP/cft. Approximately, 77% of all red oak biomass is located in the main stem and 19% in the top branches.

The high volume of red oaks combined with the high density of red oak wood may make it a valuable species for biomass production.

Additional tables: Biomass by county in 2008 ([pdf](#); [Excel](#))